# SANTA CRUZ ISLAND PRIMARY RESTORATION PLAN

## SUMMARY OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

### *Introduction*

Santa Cruz Island, the largest of the Channel Islands off the coast of Southern California, is home to a variety of wildlife including a significant number of plants and animals that can be found nowhere else in the world. Nine of its plants are listed as endangered or threatened under the Endangered Species Act. It is this uniqueness that makes Santa Cruz Island a bastion of biological diversity. An estimated 3,000 archeological sites associated with the Chumash culture are located on Santa Cruz Island. Ninety percent of the island is listed in the National Register of Historic Places (NRHP) for its archeological significance. Channel Islands National Park was established to protect and restore these nationally significant resources.

Non-native, species introduced to the island throughout the last 200 years have caused extensive damage to the island's rich resources. Without aggressive management actions to reverse the tide of degradation caused by the exotics, the island's rare biological and archeological resources are in danger of being lost forever.

This primary restoration plan proposes actions to: 1) eradicate non-native feral pigs; 2) reduce the spread and presence of fennel (*Foeniculum vulgare*), a weed that has aggressively spread and taken over a large area on the isthmus of Santa Cruz Island; 3) promote the conservation and recovery of rare species of plants and animals and the habitats on which they depend; and 4) eliminate disturbance and degradation of extensive archeological resources.

### *Description of the Alternatives*

The proposed action, Alternative Four, would reduce ecosystem and archeological site disturbance and promote species recovery by implementing a six-year pig eradication program. The program includes fencing the island into six hunting units and sequentially eradicating pigs unit by unit until pigs are totally removed from the island. To assist pig eradication, large stands of fennel on the island's isthmus would be treated. Controlling fennel involves burning the stand in the fall then applying herbicide the next to springs following the burn.

Approximately 45 miles of fence would be constructed. The fence would be located mostly along existing fence lines resulting in the island being divided into five management units of roughly 12,000 acres each, and one unit of approximately 3,000 acres. Within these units, feral pigs would be eradicated.

Priority for early hunting would be given to units that have thick vegetation, causing the unit to become increasingly difficult to hunt. Fennel treatment would be focused in areas of high fennel density that would inhibit pig removal efforts, and would be based upon the successful Central Valley Fennel Removal Project (co-funded by The Nature Conservancy and the Mellon Foundation). This protocol consists of burning large, monoculture stands of fennel to reduce standing biomass, followed by treatment with the herbicide Garlon 3A in low application rates of 1 lb AI/acre for two successive growing seasons to kill resprouts and new seedlings.

| | ***Alternative One*** | ***Alternative Two*** | ***Alternative Three*** | ***Alternative Four*** |
|---|---|---|---|---|
| ***Alternative Features*** | No Action | Simultaneous Island-Wide Eradication of Pigs | Eradicate Pigs from ESCI/ Exclude Pigs from Selected Sensitive Resources on C/WSCI | Sequential Island-Wide Eradication by Fenced Zone Hunting |
| ***Pig Eradication Strategy*** | No Eradication Strategy would be implemented | Hunt all areas simultaneously until all pigs are eradicated | Create two pig zones: eradicate pigs in NPS zone; exclude pigs from selected resources on TNC property | Trap and hunt pigs by zone until all pigs are eradicated |
| ***Miles of Fence Construction*** | None | None | ~10 | ~45 |
| ***Duration of Project*** | 0 | 2 years of eradication, 5 years inspect and monitor | 2 years of eradication, exclude forever | 6 years of eradication, 5 years inspect and monitor |
| ***Fennel Control*** | None | Prior to pig eradication - Burn fennel in the fall; aerially spray with herbicide two consecutive springs | Same as Alt. Two | Same as Alt. Two |

## *Alternatives Considered and Rejected*

### *Dismissed Alternatives and Techniques for Feral Pig Eradication*

- *Live capture of feral pigs and relocation to the mainland*
- *Use of poison*
- *Use of snares*
- *Use of contraceptives or sterilization*
- *Public hunting*
- *Introduction of swine diseases*

### *Dismissed Alternatives for Fennel Control*

- *Mechanical Fennel Control Only (No Prescribed Burn or Herbicide Application)*
- *Mechanical Fennel Control and Hand Application of Herbicide (No Aerial Spraying)*
- *Prescribed Burn Fennel Control and Hand Application of Herbicide(No aerial Spraying)*

## *Summary of Environmental Impacts*

For each alternative action, the Park analyzed the potential environmental impacts that would likely occur. Environmental impacts were divided into the following categories: Native Plant Communities, Rare and Listed Plants, Non-native Plants, Native Island Fauna, Non-native Island Fauna, Soil and Water Resources, Cultural Resources, and Human Uses.

The Proposed Action is Alternative Four: Sequential, Island-wide Eradication by Zone Hunting. Under this alternative there would be some short-term impacts to native flora, fauna, soils, waters, cultural resources, and human uses due to the activities associated with fennel control and feral pig eradication. However, following fennel control and eradication of feral pigs from a given zone, protection of irreplaceable island resources would be immediate.

### *Native Plant Communities*

- *Alternative One* - Fennel would continue to spread, aided by pig rooting. Pigs would continue to cause impacts to vegetation through rooting, accelerated soil erosion, seed predation, carrying of weed seeds, and creation of trails. Lack of regeneration of oaks would continue.

- *Alternative Two* - Fennel burn would increase soil nutrients in the short term, and kill some native plants. Fire would stimulate seed germination of some native plants. Small patches of native plants and boundary areas may experience mortality due to herbicide effects. The control of fennel and eradication of feral pigs would have substantial positive long-term effects on native plant communities.
- *Alternative Three* - Effects from fennel burn and herbicide application on NPS lands would be the same as Alternative Two. The control of fennel and eradication of feral pigs would have substantial and positive effects on native plant communities on approximately 24% of the island. On TNC land the island's native plant communities would be exposed to the feral pig impacts described in Alternative One. Lack of regeneration of oaks on TNC owned lands.
- *Alternative Four* - The environmental consequences are similar to Alternative Two. The primary difference is that the project would take approximately four years longer to complete and there would be impacts from fence building and removal. Effects from fennel burn and herbicide application would be the same as Alternative Two. The control of fennel and eradication of feral pigs would have substantial long-term positive effects on native plant communities.

### *Threatened and Endangered Plants*

- *Alternative One:* Feral pigs would continue to impact almost all known populations of listed plant species.
- *Alternative Two:* One listed plant species, *Galium buxifolium*, occurs on the isthmus where the dense fennel occurs. However, the *Galium* does not co-occur with the fennel. No burning or herbicide is planned for the coastal bluff habitat inhabited by the *Galium* and no effect is anticipated. The nine listed plant species and numerous rare plants should all benefit from the eradication of feral pigs.
- *Alternative Three:* Some protection would be afforded to rare and listed plant species due to fencing existing populations. However, sustained protection would be difficult due to the ability of pigs to break through fencing over time. Populations would not be able to recover to new habitats because of the continued presence of feral pigs.
- *Alternative Four:* Same as Alternative Two except that it would take approximately 4 more years to achieve the feral pig eradication.

### *Non-native Plants*

- *Alternative One:* Non-native plants would continue to benefit from the ground disturbance activities of feral pigs. Fennel would continue to expand into native plant communities, and annual grasslands establishing dominance.
- *Alternative Two:* Fennel burn may enhance annual grasses. Fennel would be greatly decreased. Herbicide application would greatly reduce fennel and should reduce other non-native broad-leaved plants. Removal of pig disturbance would substantially reduce long-term establishment and spread of non-native plants.
- *Alternative Three:* Environmental consequences would be similar to Alternative One on TNC owned lands. To the extent that pigs can be excluded from the eastern 24% of the island, the environmental consequences there would be similar to Alternative Two.

- *Alternative Four:* Same as Alternative Two. Fence building and removal would likely create some bare ground and may increase weed spread into disturbed areas near fencelines.

### *Native Island Fauna*

- *Alternative One:* Pigs would continue to directly and indirectly impact native wildlife through destruction of habitat, predation, competition for food, supporting enhanced populations of predators (such as ravens). Island foxes would face continued predation from non-native golden eagles.
- *Alternative Two:* There would be short-term effects on small animals due to the fennel burn. Elimination of dense fennel stands would cause changes in species composition in the long-term. Herbicide treatment is not expected to affect island fauna. Feral pig eradication would remove direct competition and predation on many island animal species. Native wildlife, such as mice, lizards and skunks would benefit. Island foxes would not face predation from non-native golden eagles nor competition for food by pigs.
- *Alternative Three:* On TNC owned lands effects would be similar as described under Alternative One. Native wildlife, such as mice, lizards, and snakes on the NPS owned lands would benefit (similar to Alternative Two) from the eradication of feral pigs in that area.
- *Alternative Four:* Same as Alternative Two, although approximately four more years would be needed to eradicate the feral pigs.

### *Non-native Island Fauna*

- *Alternative One:* Pigs would remain abundant on the island. Pigs present a readily available food source adequate to support the continued nesting by non-native golden eagles. The golden eagles would continue to opportunistically prey on native island endemic species such as the island fox.
- *Alternative Two:* Removal of pigs would eliminate the primary prey base for golden eagles. Golden eagles would no longer be able to sustain resident populations on the island.
- *Alternative Three:* Effects from fennel burn and herbicide application same as Alternative Two.
- *Alternative Four:* Same as Alternative Two, although approximately 4 more years would be needed to eradicate the feral pigs.

### *Soil and Water*

- *Alternative One:* Pig rooting and herbivory would continue to reduce plant cover and greatly increase soil disturbance and erosion.
- *Alternative Two:* Fennel burn and herbicide would standing biomass and could lead to small areas of bare soil and erosion. Eradication of feral pigs would greatly reduce soil disturbance, erosion, destruction of cryptobiotic crusts, and lessen soil erosion and stream sedimentation. Soil nutrient levels would increase in the short-term from the fennel burn and likely cause a flush in vegetation growth.
- *Alternative Three:* To the extent the NPS is successful keeping pigs from reinvading the eastern portion of the island, the environmental consequences in this area would be the same as Alternative

Two. However, for the remainder of the island (with the exception of selected fenced areas) the environmental consequences would be the same as Alternative One.

- *Alternative Four:* Same as Alternative Two, although approximately 4 more years would be needed to eradicate the feral pigs.

### *Cultural Resources*

- *Alternative One:* Pigs would continue to destroy irreplaceable archeological sites and would degrade the scientific values of the Santa Cruz Island Archeological District.
- *Alternative Two:* The fennel burn could affect historical resources, such as fencelines. Fire lines in fennel could cause ground disturbance. The primary impactor of archeological sites, feral pigs, would be eliminated in approximately two years.
- *Alternative Three:* Most of the Santa Cruz Island Archeological District would continue to be impacted by feral pigs. To the extent that pigs are excluded from the eastern portion of the island and fenced out of selected sites on the remainder of the island, archeological sites in those areas would be protected.
- *Alternative Four:* Same as Alternative Two, although approximately four more years would be needed to eradicate the feral pigs.

### *Human uses*

- *Alternative One:* Human uses would be largely unchanged. The aesthetics of visits to Santa Cruz Island would be lessened due to the reduction of native wildlife, reduction of plant cover, and destruction of archeological sites. The scientific value of the island would decrease. Pigs may occasionally be dangerous to people in certain situations. Visitors would continually encounter seasonal starvation of feral pigs.
- *Alternative Two:* Elimination of dense stands of fennel would improve the attractiveness of the isthmus for visitor use. Visitor use and access may be limited while hunting of feral pigs is active in selected areas. Eradication of pigs would improve island aesthetics, scientific values, and recreational opportunities.
- *Alternative Three:* Environmental effects would be similar to Alternative Two for most recreational uses. The scientific value of most of the island would decrease. Pigs may occasionally be dangerous to people in the central and western portions of the island.
- *Alternative Four:* Same as Alternative Two, although approximately four more years would be needed to eradicate the feral pigs.

### *Likelihood of Success*

- *Alternative One*: Alternative One (No Action) would not allow the NPS to achieve its goals for conserving natural and cultural resources on Santa Cruz Island and restoring the natural ecosystems of the island. Nine plant species from Santa Cruz Island have been listed as threatened or endangered, and island foxes have declined precipitously in recent years, are indications of the destruction of native resources caused by feral pigs. Feral pigs have irreversibly damaged numerous archeological sites.

- *Alternative Two:* This is an excellent strategy for protecting island resources but would be very difficult to achieve because of the need to fund and support a very large operation over a short period of time. Funding and logistical realities substantially lessen the "Likelihood of Success" for this alternative.
- *Alternative Three*: This has a low "Likelihood of Success" because more than three-fourths of the island, containing extremely significant natural and cultural resources, would continue to be subjected to feral pig impacts. Additionally, it is expected that maintenance of a pig-proof fence across the island would be expensive and an exercise in futility. Pigs are very adept at breaking through fences. It is doubtful that park personnel, with all the demands and issues they face, could sustain in perpetuity the effort necessary to hold a fenceline. Once pigs breached the fence, even accomplishments on the eastern fourth of the island would be lost or would be extremely expensive and time consuming to recover.
- *Alternative Four*: This has the highest "Likelihood of Success" because it achieves the best balance of expeditiously and comprehensively protecting resources in a manner that the NPS is likely to be able to support financially and logistically. The longer time necessary to complete the project would allow more post-sheep removal vegetation recovery, increasing the difficulty of feral pig eradication.

## *Response to Comments*

In total, 36 letters or e-mail correspondence were provided to the Park during the 60-day comment period for the Draft EIS. From this correspondence, the Park identified 66 substantive comments. Substantive comments are those that are not simple statements for or against the proposal, but rather those comments requiring additional explanation or analysis of data and those that debated facts or conclusions rendered in the Draft EIS. These comments were divided into 14 categories. In the "Response to Comments" section the Park provides responses to all 66 substantive comments received on the project.

### *Draft EIS Commentator List*

| Government Agencies | Groups and Organizations | Individuals | Individuals |
|---|---|---|---|
| U.S. Environmental Protection Agency | In Defense of Animals | Betine Corimby | Ms. Gayle Harris Birk |
| U.S. Fish and Wildlife Service | National Anti-Vivisection Society | Mrs. Phyllis E. Grame | Pinky Jain Pan |
| U.S. Army Corps of Engineers | Santa Cruz Island Foundation | Jeanne E. Arnold | Larry L. Loeher, Ph.D. |
| | Santa Barbara Audubon Society | Maureen Edwards | Allison Marie Memmo Geiger |
| | Catalina Island Conservancy | Linda Saffell | Brian Ehler |
| | | Helene Schwartz | Jennifer Graham |
| | | Dieter Wilken, Ph.D. | Jeannette Ferro |
| | | Siobhán Gephart | |
| | | Dolores and David Ferraro | |

| Government Agencies | Groups and Organizations | Individuals | Individuals |
|---|---|---|---|
| | People for the Ethical Treatment of Animals<br>California Native Plant Society<br>Santa Barbara Museum of Natural History<br>University of California, Davis<br>California State University, Long Beach | Betty L. Jeppesen<br>Diana Cora<br>Joy M. Zakarian, M.P.H<br>Andrea Heaton | Ms. Robin Betian<br>Brian Ehler<br>Jennifer Graham<br>Jeannette Ferro |

***Comment Categories***

| Category | General Comment Summary |
|---|---|
| **Herbicide** | Use of Garlon 3A |
| **T&E Plants** | Protection of T&E plants from herbicide application |
| **Water Quality / Erosion** | Water quality and use of herbicide/ Activities effect on WQ |
| **Alternatives** | Clarification or suggestion on alternatives |
| **Exotic Species** | Response of exotic species to fennel control program |
| **Cultural Resources** | Mitigation activities to protect cultural resource sites |
| **Air Quality** | Air Quality impacts from prescribed burn and eradication activities |
| **Economic** | Sport hunting of pigs/ Cost of pig eradication and fennel control |
| **Purpose and Need** | Purpose and Need |
| **EIS Organization** | Literature Cited |
| **Effects Analysis** | Clarification or comment on effects analysis |
| **Island Fox** | Effect of hunting dogs on the Island fox |
| **Sterilization/ Ethical Treatment of Animals** | Use of Gonex sterilant/ Ethical treatment of pigs |
| **Access** | Access restrictions for the public and researchers |

### *NPS Response to the Two Most Common Comments*

Comment: *The Park needs to consider the use of Gonex, a sterilant, to eradicate pigs on Santa Cruz Island*

Response:

Gonex

Gonex is a chemical compound currently under development for use as an injectable sterilant for all mammals. It works by destroying the gonadotropin hormones secreted by the anterior pituitary gland. Those hormones are required for successful reproduction, and are the same in all mammals.

Gonex does not have Food and Drug Administration (FDA) approval and therefore cannot be used on this project. There is no indication that this drug would receive FDA approval in the near future. Even if Gonex were to gain FDA approval there is no indication that it would be a viable tool for feral pig eradication, since sterilants in general have proven ineffective for use in an eradication program.

Sterilization

Sterilants in general cannot be used for this project because: 1) use of a sterilant would require injecting and marking each pig on the island; and 2) they are unproven for an eradication program.

*Requires Injecting and Marking Each Pig on the Island*: The logistics of delivering the sterilant to all pigs on the island comprises an insurmountable obstacle. Because a certain percentage of pigs become trap shy (avoid traps), delivering injections to all pigs would be impossible. The annual effort required would exceed the capabilities of NPS and TNC. And unless treated animals were marked, it would be impossible to distinguish treated pigs from untreated pigs. There is no permanent marking for a feral animal that is not directly handled.

*Unproven for an Eradication Program*: Sterilants are unproven for any mammal eradication program. Use of any sterilant on Santa Cruz Island feral pigs would be a waste of money and would not achieve the purpose of this plan, which is to eradicate feral pigs island-wide. Use of any sterilant would, at best, control pig populations for the period of time that teams of hunters would be funded, and certainly could not eradicate them. Short-term control of the pig population is not acceptable, because pigs would quickly multiply and continue to impact natural and cultural resources.

Comment: *The Park needs to consider a more humane method to deal with the pigs on Santa Cruz Island.*

Response:

Humane Treatment

The EIS did look into other methods of killing pigs, including snares, poison, and introduction of swine diseases. These methods were dismissed in part because they would not have the efficacy of a well-placed gunshot. These other methods could also inflict more pain and suffering to the pigs. In a report sponsored by the American Veterinarian Medical Association (2001) they indicate that an accurately delivered gunshot is an acceptable method of euthanasia. For wild or free-ranging species, a gunshot may be the most practical and logical method of euthanasia and has the advantage of minimizing stress induced by handling and human contact (AVMA 2001).

Annually, Park and TNC staff, as well as the visiting public, witness the starvation of pigs on the island. Park staff, especially those who work on the island, feel strongly that it is more humane to deal with pigs in the manner proposed in this EIS, versus having to witness the annual starvation that occurs to pigs on the island. The Park and TNC agree with the characterization of the humane treatment of pigs on Santa Cruz Island provided by Adrian M. Wenner, Professor emeritus, Department of Ecology, Evolution and Marine Biology UCSB:

> *"As a biologist, I have had extensive experience on the island and can report first-hand about the pig situation there. Feral pigs on the island number in the thousands. In good years, they reproduce to their full ability and soon exceed their food source. As they run out of easily obtainable food, such as acorns, they desperately plow up the ground in search of bulbs, roots and tubers, leaving the soil open to being washed away in future rains; and thereby exterminating native plants. They then eat non-nourishing grass as they starve. During the 1988 and 1989 droughts, for example, perhaps nine-tenths of the pigs died of starvation. But pigs don't starve immediately; as the weaker ones succumb, they get attacked and eaten by stronger pigs. At those times we could hear the squeals of pigs in such fights. By the end of 1989, nearly every pig I encountered was nothing more than a bag of bones that could hardly move. When they noticed us, they most often fell over as they tried to move. Even in good years feral pigs suffer. Last week we grabbed a piglet for examination. Dozens of black-legged ticks -- vectors of Lyme disease, fleas and lice lived on its soft underside. Island feral pigs, when they overpopulate, cannot migrate to greener pastures; they starve. Is it more humane to let these feral pigs continue their overpopulation, starvation and cannibalism or eliminate a few thousand from the island now, before untold thousands die in the future during such cycles?" (Wenner 2001)*